PHYSICAL GEOGRAPHY IN THE HIGH SCHOOL

Limitation of the subject.—A review of the older books on physical geography, and of some of the newer books also, will show that their various authors have not reached a clear agreement as to the limits of the subject. It has been allowed to run over upon physics and astronomy on one side and on geology, botany, and zoölogy on the other. As a result the central and truly geographical parts of the subject have as a rule been compressed below the space that they should occupy when properly developed. A way out of this confusion is found in a report recently made by the Committee on College Entrance Requirements to the National Educational Association. The reporting members of the subcommittee concerned with our science unanimously agree that "it should be the aim to exclude a number of subjects frequently treated under physical geography, but more appropriately included under other heads; for example, purely astronomical matter, certain principles of physics, the classification of animals and plants, and tables of geological periods. Important and interesting as these subjects are in their proper connections, it is believed that a better mental discipline will be obtained from physical geography when all its parts are closely joined to its leading theme," namely, "the physical evironment of man," under which the principal headings are "the earth as a globe, the atmosphere, the oceans, and the lands."

The agreement upon this limitation of the subject by the teachers present at the meeting of the subcommittee and the approval of their agreement indicated by the publication of their report by the National Educational Association marks a decided step forward from the indefiniteness of earlier years. Although slow in coming, the limitation is really an outgrowth of Ritter's teaching that geography is the study of the earth in relation to man, from which one may naturally deduce the definition of physical geography—or physiography—as the study of those features of the earth which are involved in the relation

of earth and man; that is, the study of man's physical environment. In later years of education the physics of the atmosphere, the forms of the land, and other branches of the subject may be studied for themselves alone under the general name of terrestrial physics or under such special names as meteorology, geomorphology, and so on, without special regard for their human relations; but when first encountered the limitation of the subject to man's physical environment has the great advantage of holding all its topics close to their most important and interesting theme. The earth's form and size, its rotation and revolution are geographical as well as astronomical topics; but a list of planets, their dimensions, distances from the sun, and periods of rotation and revolutions are astronomical topics. Let the teacher introduce these interesting items if her interest turns towards astronomy, and if time can be spared for the purpose; but the space that they would occupy in the text-book should be saved for the fuller presentation of strictly geographical topics. To illustrate this by personal experience I may note that the nebular hypothesis held its inherited place in my lectures only so long as the richness of the rest of the subjects was not sufficiently developed to crowd out so irrelevant an astronomical theory.

The forms of the land can be well seen only through the eye of the understanding, which shows them to be the product of agencies that have operated for long periods of past time; the "shut-in" valleys of the St. François Mountains of Missouri and the Baraboo Ridge of southern Wisconsin are never appreciated until they are seen as involving long stretches of time in their preparation. Thus far time is an element of geographical as well as of geological consideration; but the specific subdivision of past time into periods and the consideration of the events that occurred during those periods in their historical order is purely geological. By all means let the inventive teacher bring in abundant and helpful illustrations from all pertinent fields of knowledge, but let the teacher also recognize that there is a well-defined theme in physical geography whose logical development must govern the selection of topics that really constitute

the framework of the course. A fact may be interesting and important, but it must also be pertinent to our science if a place is to be given to it in a well-organized text-book of physical geography.

Geographical evolution.—The contrast between older and newer methods of treatment is as well marked as between the older and newer limitations of our subject. In the days of Ritter many subdivisions of physical geography, and especially the chapters devoted to the forms of the lands, were treated empirically, because no adequate explanation had then been found for them; and the relation between organic forms and their inorganic environment was explained, when explained at all, by the philosophy of teleology—the philosophy which, among other things, regards the earth as prepared for man—because no conception had then been gained of the duration of the past time or of the development of the various forms of life. Since those days two great principles have been discovered, both of vast importance to geography. One is the evolution of land forms, contributed from geology; the other is the evolution of living forms, contributed from biology. Great advances have also been made in the physical study of the atmosphere and the ocean. As a result it is now possible to treat all aspects of physical geography in a rational manner, and at the same time to show the fundamental importance of the relation between physical environment and life. The changes thus wrought by the century are revolutionary in physical geography as well as elsewhere, and it is incumbent upon us to see that our pupils reap full advantage from the new opportunities thus broadly opened before them.

Causes and consequences.—There is no better measure of the degree of modernization in the treatment of physical geography than the evenness with which a rational or explanatory treatment is applied to all its parts. In the earlier books, explanation was offered only for the more active phenomena, such as winds, currents, and volcanoes; geographical features that were not evidently the result of active processes were merely described. In the newer books the attempt is made to extend explanation uniformly all over the field of study. A review of older and newer

methods is especially interesting in regard to the forms of the lands. Sand dunes, for example, have nearly always been mentioned in connection with their simple and evident origin by wind action; but the erosive action of weather and water in shaping valleys has been slowly and incompletely introduced. Cañons have been given too much importance, and only the more recent books have instanced wide open valleys and worn-down mountains as illustrating the advanced stage of destructive development in which cañons are but the younger stage. It is undoubtedly true that many items of the subject are not yet fully explained, but there are many others for which good explanation is well assured. Let the latter be selected to form the body of the subject in elementary teaching, while the former are left aside for the present, or given at most only a subordinate place. The judicious application of this principle will not impoverish the subject by reducing it to scanty dimensions, but will enrich it by the addition of intelligent explanations. The pupils will from the outset gain the habit of looking at the subject in a rational way. They may to advantage even be prejudiced with the opinion that all its parts are within the reach of explanation; then, if an unexplained fact is encountered later, it will be attacked vigorously in the belief that explanation can surely be found by persistent study.

Equally significant with explanatory treatment is the applied treatment; that is, the presentation of every item as an element of the environment in which the life of the earth has been developed, and by which it is still conditioned at every turn. This second test of modernized treatment is as valuable as the first. When the applied treatment of the subject is understood it will be recognized that plants, animals, and man should not be given special chapters for themselves in the modern limitation of the contents of physical geography, for the very sufficient reason that mention of them is distributed all through the subject. Gravity determines the "standing" position of plants and animals. Latitude and longitude should be taught as devices by which man takes advantage of the form and rotation of the earth to determine his position on it, not as abstract

mathematical problems. The chapters on temperature and moisture give opportunity for mentioning many appropriate consequences as to the distribution of plants. Under the description of the shallow border of the oceans, where the waters lie upon the so-called "continental shelf," proper opportunity is found for referring to these waters as the habitat of food fishes and therefore as valuable fishing grounds. A general account of the larger land forms leads up to the control exerted by continents, mountains (especially the Himalaya), and deserts (especially the Sahara) upon the distribution of man and animals. Under mountains reference is made to their significance as refuges for conquered tribes or peoples. Avalanches and landslides are not finished with a description and explanation of inorganic phenomena alone; they are also presented as dangers to which people living in mountain valleys are subjected. Here we may well introduce Guyot's eloquent sentence as a practical guide in our work: "To describe without rising to the causes or descending to the consequences is no more science than merely and simply to relate a fact of which one has been a witness."[1] The phrase, "causes and consequences," thus comes to serve as a touchstone by which both the explanatory and the applied treatment of the subject may be easily tested. Just as a topic that is beyond explanation had better as a rule be omitted, in order to give fuller attention to topics that can be explained, so a topic that has no connection with the manner in which organic forms are distributed or with the occupations in which men are engaged should in nearly all cases be excluded as of less importance than those topics in which such connection is manifested. Neither test of the touchstone should be applied rigidly or arbitrarily; but the habit of looking for causes and consequences is a most useful aid in the development of the subject. No one need fear that the reasonable application of this test will deprive physical geography of anything that rightly belongs to it.

The omission of "man," "animals," and "plants" as chapters in physical geography frequently causes objection on the part of those who hold to the older plan of treatment. Against

[1] *Earth and Man*, 1849.

such objections I would urge the following considerations: The necessity for the study of man comes largely because the treatment of geography proper has been too empirical and unintelligent; when this old fashion is corrected there will be no need of a chapter on man in physical geography. Plants and animals are properly subjects for zoölogy and botany; their structural features and their classification cannot be taught merely as chapters in another subject. On the other hand, palms and pines, elephants and polar bears may be freely mentioned as exhibiting in their distribution the effects of climatic control; wheat and corn fields are appropriate products of the rich soil on our prairies, in contrast to the forests which grow on the stony soils of our Appalachian mountains and uplands. It is not necessary to have studied the biological relations of these organic forms in order to make intelligent use of them as illustrations of the effect of environment. But the actual distribution of useful plants and animals is strictly a geographical subject, and no intelligent or effective treatment of political or economic geography can be reached if the facts of distribution are omitted from it.

Physical geography abroad.—It is interesting in this connection to glance at the treatment of physical geography abroad, in contrast to the treatment recommended by the subcommittee of the National Educational Association. As to limitation of content there is the same wide diversity that has hitherto existed here, but without any strong movement now apparent to reduce the subject to better definition. Absence of proper limitation is most apparent in the "Physiography" of the South Kensington examinations in England, where the subject is a sort of extension of a very elementary treatment of physical geography. It reaches as far as spectroscopic observations of stars and nebulae, evidently because of the presence of an astronomer on the committee in charge of this division of the examinations; and the physical geography of the lands is almost lost sight of, evidently because no physical geographer is on the directing committee. This is the more remarkable and regrettable when it is remembered that the term, physiography, has been adopted because of

Huxley's use of it as a title for a series of lectures in 1869 and 1870. The lectures were reduced to book form in 1878, and in the preface then published we find the following interesting statement:

I borrowed the title of "physiography" as I wished to draw a clear line of demarcation, both as to matter and method, between it and what is commonly understood by "physical geography." Many highly valuable compendia of physical geography, for the use of scientific students of that subject, are extant; but, in my judgment, most of the elementary works I have seen begin at the wrong end, and too often terminate in an *omnium gatherum* of scraps of all sorts of undigested and unconnected information; thereby entirely destroying the educational value of that study which Kant justly termed the "propædeutic of natural knowledge." I do not think that a description of the earth, which commences by telling a child that it is an oblate spheroid, moving round the sun in an elliptical orbit, and ends without giving him the slightest hint towards understanding the ordnance map of of his own county; or any suggestion as to the meaning of the phenomena offered by the brook which runs through his village, or the gravel pit whence the roads are mended, is calculated either to interest or to instruct. And the attempt to convey scientific conceptions, without the appeal to observation, which can alone give such conceptions firmness and reality, appears to me to be in direct antagonism to the fundamental principles of scientific education. "Physiography" has very little to do with this sort of "physical geography." My hearers were not troubled with much about latitudes and longitudes, the heights of mountains, depths of seas, or the geographical distribution of kangaroos and *Compositae*. Neglecting such points of information—of the importance of which, in their proper places, I entertain no doubt—I endeavored to give them, in very broad, but, I hope, accurate outlines, a view of the "place in nature" of a particular district of England, the basin of the Thames; and to leave upon their minds the impression that the muddy waters of our metropolitan river, the hills between which it flows, the breezes which blow over it, are not isolated phenomena, to be taken as understood because they are familiar. On the contrary, I have endeavored to show that the application of the plainest and simplest processes of reasoning to any one of these phenomena, suffices to show, lying behind it, a cause, which again suggests another; until, step by step, conviction dawns upon the learner, that, to attain to even an elementary conception of what goes on in his parish, he must know something about the universe; that the pebble he kicks aside would not be what it is and where it is, unless a particular chapter of the earth's history, finished untold ages ago, had been exactly what it was. It was necessary to illustrate my method by a concrete case; and as a Londoner addressing Londoners, I selected the Thames and its basin, for my text. But any intelligent teacher will have no difficulty in making use of the

river and river basin of the district in which his own school is situated for the same purpose.

It is said that much disappointment was felt by those interested in the development of rational methods in education, on finding that teachers in various parts of England were following Huxley in taking as their text the Thames instead of their local river! Still greater disappointment may be felt on seeing how far the spirit of what Huxley understood under the name, physiography, is lost sight of in the books that undertake to present the requirements of the South Kensington examinations on that subject. It may, I believe, be fairly claimed that the recommendations of the conference on geography, above referred to, much more nearly represent the "sort of physical geography" in which the great English naturalist was interested than do the outlines issued by the most authoritative board of examinations in England today.

An explanatory treatment is usually applied in German and French school books to the active phenomena of the earth, but the treatment is not uniformly characteristic of all parts of the subject. Applied treatment is almost universally lacking in European schoolbooks on physical geography; and when encountered it seems to be introduced by accident rather than as the result of a systematic plan. Its omission is especially characteristic of the German books, whose comprehensive thoroughness is often remarked, but whose plan would place them rather under the heading of terrestrial physics than under physical geography, as here defined. Hence it may be said that when the recommendations in the report of the National Educational Association reach the stage of general and practical application, physical geography will be better organized in this country than in Europe; a result that may be placed to the credit of the unofficial educational organizations of the country, which are so generally influential in bringing about reforms, and which are here very much less hampered by the restrictions of a centralized or bureaucratic control of educational matters than is the case abroad.

Let us now turn to the problem of the arrangement of topics under the four chief headings of our subject.

Systematic treatment: the atmosphere.—It is important that a careful arrangement as well as a judicious selection of topics should be made, in order that the subject should advance systematically, in as logical a progress as actually prevails in geometry or Latin, or as is possible in botany or zoölogy. Passing the earth as a globe for lack of space, an example of the arrangement may be given under the heading of the atmosphere, by which the correlation of the prevailing winds and general distribution of rainfall may be impressively presented.[1] First comes the general circulation as determined by the difference of temperature prevailing between the equator and poles, and as affected by the eastward rotation of the globe. Well defined consequences as to the distribution of pressure and the oblique movements of the upper and lower currents are reasonably deduced from accepted physical principles governing such movements, but the difficulty here is that the real explanation of the winds cannot be presented in an elementary fashion; the problem is inherently complicated, and only the more important results are appropriate for high-school pupils; hence the general principle that cause must be presented with fact cannot here be fully carried out. Difference of temperature and the rotation of the earth may be mentioned as the chief controls of wind movement and direction, but the logical connection of cause and effect cannot be fully explained. Nothing need be said about the distribution of atmospheric pressure, unless the text and the teacher are prepared to explain the low pressures of high latitudes. It is true that it has become fashionable in recent years to copy Buchan's pressure charts in elementary books, but it would be more philosophical to postpone them to more advanced study. Variations of pressure at sea level are not of importance as factors of geographical environment; and it is difficult to give a simple explanation of the observed variations. The winds determined by general differences of equatorial and polar temperatures may be called planetary, because such winds are to be expected on all planetary bodies, and the chief members of the planetary

[1] See an article on this subject in the *School World*, Macmillan, London, 1899.

circulation may be described along with the rainy and dry belts that they control. The second step is more intelligible, as it involves the effect of seasonal changes of temperature, themselves well explained by the changing declination of the sun; relatively simple modifications of the planetary wind system (and of its rainy and dry belts) are thus described, to which the name of terrestrial winds are to be given. The shifting of the equatorial calm belts and the associated development of monsoon winds and subequatorial rains in the summer hemisphere find mention at this stage: also the relaxation of the westerly winds of the temperate zone of the summer hemisphere, and their acceleration in the temperate zone of the winter hemisphere, with the correlated migration of the tropical calm belt and the associated occurrence of the winter subtropical rains. The third step is made by considering the irregular distribution of land and water, from which it appears that the systematic development of the terrestrial winds is better seen in the southern hemisphere, while strong modifications of winds and rainfall are associated with the great alternations of land and water areas of the northern hemisphere. It may be fairly claimed for this method of presentation that it binds together all the elements of the problem, temperature, pressure, winds, and rainfall, in a rational association, by which the memory as well as the understanding is greatly aided. Nearly all the topics introduced under the atmosphere may be appropriately attached to the scheme of treatment here outlined and all may be led forward to important consequences.

The ocean.— Under the ocean, the sequence of items is fairly well agreed upon. They are: the form of the ocean basins, the composition and temperature of ocean water, the deposits on the ocean floor, movements in the form of waves, currents and tides, influence of climate, and control over distribution of organic forms. The only point on which I would lay special emphasis here is that tides should follow waves (with currents between, as the consequence of winds and temperatures), so that the tidal currents may be explained as the orbital movements of the water in the tidal waves. Under tides, a good explanation of the

tide-making forces may be given to pupils who have studied geometry and physics; otherwise, it is hardly worth while to attempt explanation. It should suffice to point out that the tides run on lunar time, and hence must in some way be associated with the moon. An explanation that does not explain is not worth its time.

Activities of the lands.—Under the lands, there is as yet no general agreement as to the order of topics, or indeed as to the topics themselves. After various experiments in this division of the subject, I have adopted the scheme indicated in the following statement. A general account of the activities or habits of the lands opens the subject, and here we find the best warrant for the previous consideration of the deep ocean floors, in themselves so remote from relations with man, but so excellent a foil for the presentation of the real characteristics of the lands. The sea floors are cold and dull (no sunlight reaches them, though they may have some illumination from phosphorescent animals, as is indicated by the eyes and the color patterns of abyssal fauna); their oozy deposits are almost as monotonous as their gently undulating form; they are silent, and without change of weather or variety of climate. The lands are alternately light and dark, warm and cold, even and uneven, active and quiet, noisy and silent; here is one composition there is another, with great differences of weather and climate in time and place, and the surface is nearly everywhere wasted and furrowed by valleys down which the loss of the land is carried away by rainfed streams to become the gain of the sea. Now that evolutionists as well as poets recognize that variety is the very spice of life, there is little wonder that the land surface and not the sea floor has come to be the home of the higher animals, higher in organization, in instincts and in intelligence, with man at their head. A general chapter on the land may thus be made of much interest and value. Special emphasis should be given to a brief account of weathering and washing, topics of great importance in their later applications. As at present advised, I should also include in this preliminary chapter some brief mention of the slow movements of the earth's crust, whereby the outline of

the land areas is slowly varied through the ages. Here a sea-floor border is added to a continent by a movement of elevation; there a land border is submerged beneath the sea by a movement of depression. It is true that these statements are empirically introduced in this connection and that no explanation of them can be attempted, for the cause of crustal movement is a puzzle even to the advanced student of geology. The sufficient reason for introducing brief mention of crustal movement at this early stage is that examples of their effects, encountered a little later, may be then understood more easily.

Features of the lands.—The lands are next to be treated in several chapters. Through each chapter the development of the land forms there considered should be treated from the point of view of geographical evolution, a problem too large for presentation here; it has lately been given separate publication elsewhere.[1] In recent years I have made a particular point of beginning this division of the subject with the chapter on coastal plains, because of all land forms they are most easily apprehended; that is, the origin of young coastal plains; the position that they occupy with respect to their surroundings; the developmental changes produced by the destructive attack of weather and water can all be readily understood by young scholars without more preliminary study than is given in the general chapter on the activities of the lands. The great advantage resulting from a full and clear understanding of the first example of land forms is that a serious beginning is thus made of treating land forms genetically and rationally. Although not usually allowed much space, coastal plains, modern and ancient, young, mature and old, uplifted and depressed, include a great variety of forms; the reasonable explanation that can easily be given to all these forms affords the pupils good grounds for the expectation that plateaus, mountains, volcanoes, and other forms in the following chapters may be no less rationally treated. This expectation is not disappointed in the chapter on plateaus, or in the earlier

[1] See articles on "The Rational Element in Geography," *Nat. Geogr. Mag.*, Vol. X, 1899, pp. 466–473, and "The Geographical Cycle," *Geogr. Journal* (London), Vol. XIV, 1899, pp. 481–584.

examples that may be given of simple mountain forms; but when lofty mountain ranges are reached, it is not desirable to attempt an explanatory discussion of their greatly deformed structures, or of all their complicated forms. Fortunately, the pupil will not complain of lack of material if nothing more is attempted under this subdivision of the chapter than the description, with some explanation, of peaks, ridges, spurs, passes, ravines, valleys, and slopes. The treatment of subdued and worn-down mountains that follow lofty mountains is much simpler and may be readily enough understood. Worn-down mountains, now uplifted and again undergoing dissection, include examples of many regions whose description and explanatory treatment today is a refreshing contrast to the inattention of earlier years.

Volcanoes form a chapter that may naturally follow mountains; but it is important to distribute earthquakes through both these chapters in order to remove the old idea that they have only to do with volcanic action. "Volcanoes and Earthquakes" as a chapter heading has no logical place unless it is paralleled with "Mountains and Earthquakes" as another. Neither heading is a good one; it would be as appropriate to say volcanoes and eruptions, or mountains and dislocations; for eruptions and earthquakes are both subordinate topics under volcanoes as dislocations and earthquakes are under mountains. Furthermore, earthquakes are associated only with growing mountains and volcanoes, and not with the old stages of these forms; hence the permanent association with either land form indicated by chapter headings is inadmissible.

Rivers and valleys.—Under all the topics thus far mentioned, rivers and valleys have had an essential place, for it is impossible to treat the development of land forms, or to describe existing forms in a rational manner without constant reference to the valleys that have been worn in them and to the rivers by which the waste is washed away along the channel in the valley floor. From the very first, rivers and valleys have been made characteristic parts of the land surface; lakes are directly associated with rivers because, when considered in their true light, they are but "ephemeral phases in the history of rivers." Rivers and lakes,

and the valleys and basins they occupy, are therefore considered wherever need be in connection with plains, plateaus, mountains, and volcanoes. But there are numerous details of interest and importance that deserve special consideration under the guidance of a scheme of river development; hence a chapter on rivers and valleys may advisedly follow those already mentioned, reviewing and extending what has already been presented. The development of meanders and cut-offs, the migration of divides and the resulting rearrangement of drainage systems by river capture, the peculiar features of valleys whose streams have been beheaded, are details of this kind. This is a strong departure from the English method, sanctioned by the South Kensington examinations, as at present planned, of placing lakes and rivers under the same general division with the oceans, because they are all water: a method that cannot be too strongly condemned by those who desire to see a reasonable treatment of physical geography introduced. As well take clouds and rain from the study of the atmosphere as lakes and rivers from the study of the lands.

The waste of the land.—There is a chapter that naturally follows rivers and valleys in which I have become increasingly nterested during the past ten years on account of its growing richness; the more it is considered the more it seems to contain. It may be entitled, "The forms assumed by the waste of the land on the way to the sea." Like the chapter in which rivers are especially considered, this one repeats certain items already met with under the four chapters on the chief classes of land forms; but many other items which there was then no sufficient opportunity to describe without too long a delay may now be taken up deliberately. The process of weathering, whose importance is so great that it was presented as an essential characteristic of the lands, is now reviewed, thus leading to a consideration of the sheet of rock waste or discrete, as Gilbert calls it, with which so much of the land is covered, and more particularly to an examination of the forms assumed by the slow-moving waste as it creeps and washes down the slopes to the valleys, and as it is carried along by streams. It may be fairly claimed for this

chapter that it gives a greatly broadened view of familiar facts and presents them in their true relations. We are all familiar with the forms assumed by the waters of the land on the way to the sea, springs, brooks, rivers, lakes, and falls: we should be equally familiar with the forms assumed by the waste of the land on the way to the sea, talus slopes, alluvial fans, flood plains, deltas.

Climatic control of land forms.—Thus far, it has been tacitly implied that the development of land forms always goes on under what may be called a normal climate; that is, a climate in which the precipitation, chiefly in the form of rain, is sufficient to fill all basins to overflowing. All that preceded concerning land forms may be regarded as a consideration of the control of land forms by normal climate. Attention must now be given to two other climates, the arid and the glacial. Wind in one case and ice in the other, replaces water as the chief agent of transportation; and peculiar land forms are developed under these peculiar controls. Here are placed those peculiar regions known as interior drainage basins, in which certain highly specialized correlations of form and process are found; correlations that are very little understood by explorers, if one may judge by the unappreciative method of description often adopted. Nothing is more significant of advance in the rational treatment of geography than the recognition lately allowed to forms of glacial origin; and it is truly gratifying to find that there are children now in schools who know a drumlin when they see it, and who can give it a name that will concisely suggest the meaning desired to a hearer of like intelligence. Additional interest attaches to the chapter on the control of land forms by special climatic conditions when it is shown that climate is not constant, but that in certain parts of the world the climate of the recent past (as the earth counts time) has been different from that prevailing today, and that many marks of the past climate are still distinct in the existing topography. Thus topographical forms produced under the former normal climate of many basins now arid, and under former glacial climate of many regions now normal, are appropriately introduced, on branches that depart in an orderly fashion from the main theme; and this I hold to be just as important in geography as in geometry.

Shore lines.—The chapter on shore lines may be advisedly placed at the end of a general course on physical geography, for it cannot be introduced earlier without interrupting the sequence of chapters just sketched, and because it fittingly follows all of them. It is entirely inappropriate as a part of the study of the oceans, although it was there placed by Peschel. The natural association of this topic is with the forms of the land. One of the most pleasing results of the rational study of shore lines is the discovery that their development may be treated just as systematically as that of land forms; and indeed that many general principles established in the study of land forms as affected by the subaerial agencies of erosion, are equally applicable to the seashore, when allowance is made for the marine agencies of erosion there in action.

Plants, animals, and man.—It may be noticed that no place is given in the list of topics here considered to plants, or animals, or man. This is because organic forms do not in themselves constitute any part of the content of physical geography, however largely they may enter into geography proper. It is therefore proper not to place plants, animals, and man, as chapter headings equivalent to plains, rivers or shore lines, unless merely with the intention of gathering in one place and emphasizing the "consequences" already presented in connection with their physiographic controls; but on the other hand, it is extremely desirable that plants, animals, and man should receive frequent mention in every chapter, in illustration of the organic consequences that follow from controls exerted by physical environment or organic opportunity. Herein the method of the American school, if the recommendation of the subcommittee of the N. E. A. may be so called, differs distinctly from that of the European, in which the physical features of the earth are considered for themselves alone and without regard to the conditions, favorable or unfavorable, that they offer for life, be it low or high. The omission of "consequences" seems to me almost as unfortunate as would be the omission of "causes."

Areal geography.—There is another omission from the content of the subject as outlined above that may excite comment,

The areal study of the several continents, as made up of physical features of various kinds, is not attempted. This is because it is not possible to give both a general and an areal course on physical geography in a single year. Neither part of the course could be properly developed in so short a time. It is true that some knowledge of the physical geography of North America and Europe are very important, indeed, that it ought not to be sacrificed to the impossible by attempting to present the physical features of all the continents as a supplement to the general principles of physical geography in a single year. Instead of teaching the areal physical geography of even North America and Europe in the general course, it is better to use many features from these grand divisions as type examples in the several chapters to which they belong, always locating the examples by reference to maps. Clear ideas of some few things will thus be gained instead of vague and imperfect ideas of many things. If there is time to spare, a following course on the physical geography of the continents would be interesting and profitable; but as part of a general course this subject cannot receive adequate attention.

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(*To be continued.*)